# Update on Lyme Disease Reporting and Surveillance, Wisconsin, 2013

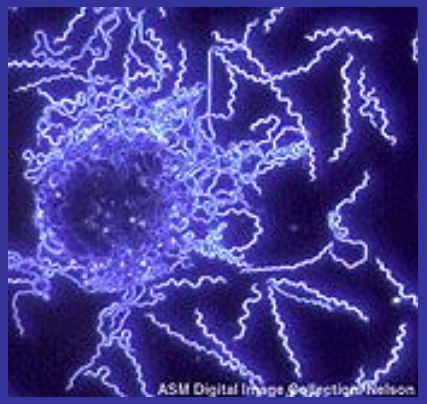
**Diep (Zip) Hoang Johnson**
**Christopher Steward**
**Division of Public Health**
**Wisconsin Department of Health Services**
**608-267-0249**
**03/19/2013**

Protecting and promoting the health and safety of the people of Wisconsin

# Overview

- Lyme disease and tick vector characteristics.
- Laboratory testing, results, and interpretations.
- Epidemiology and Statistics.
- Treatment and Prevention.
- Review of reporting requirements in Wisconsin.

# Lyme Disease



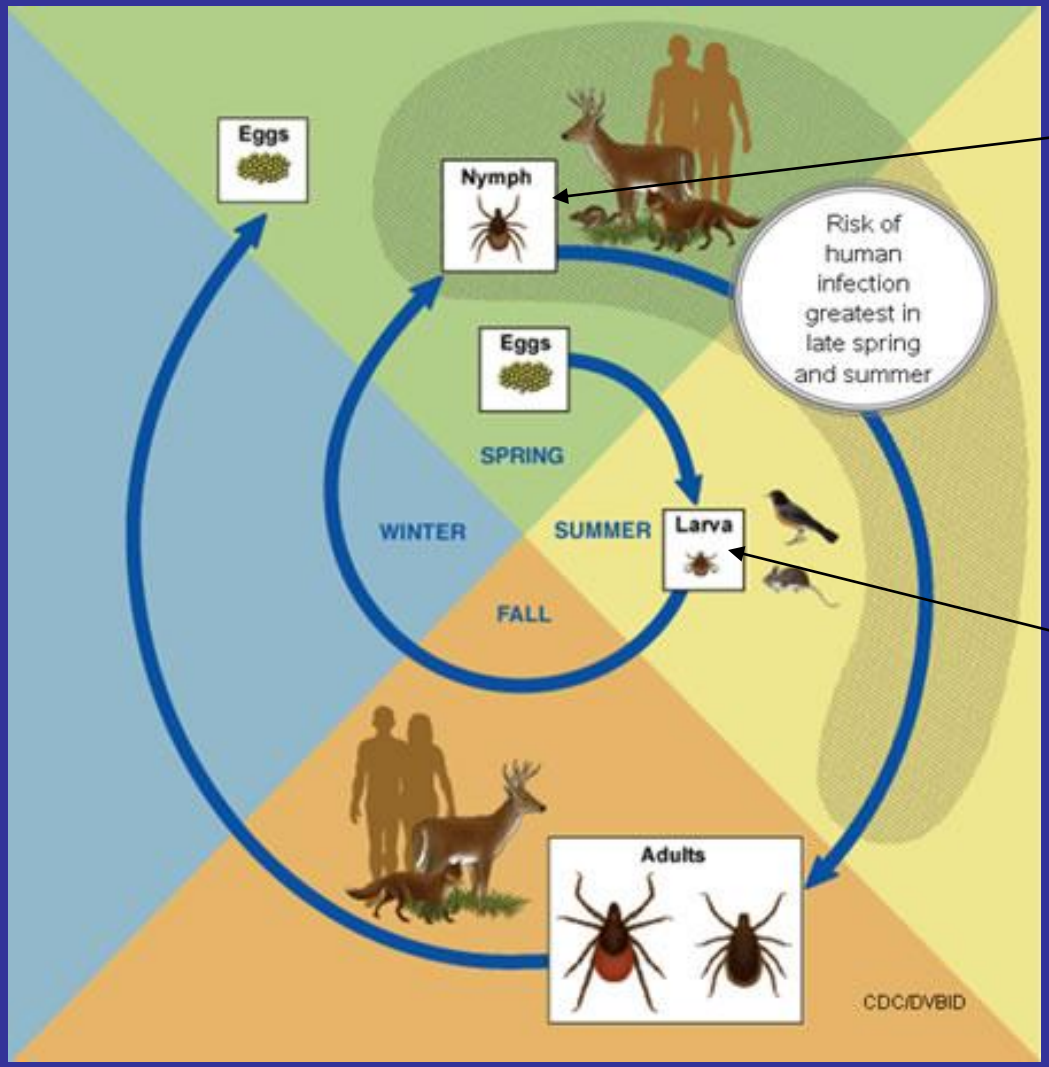

**Bacteria - *Borrelia burgdorferi***

# *Ixodes scapularis*

Transmit

- Lyme disease.
- Babesiosis.
- Anaplasmosis.
- Ehrlichiosis.
- Powassan infection.

# Life Cycle of Blacklegged Tick




**Based on EM case onsets, nymphs account for most transmission.**

**Larva do not transmit bacteria to humans.**

**During the 2-year life cycle, total 3 blood meals.**

Courtesy of CDC

# *Ixodes scapularis* (Blacklegged or Deer Tick)

Adult female deer tick

Adult male deer tick

Nymph

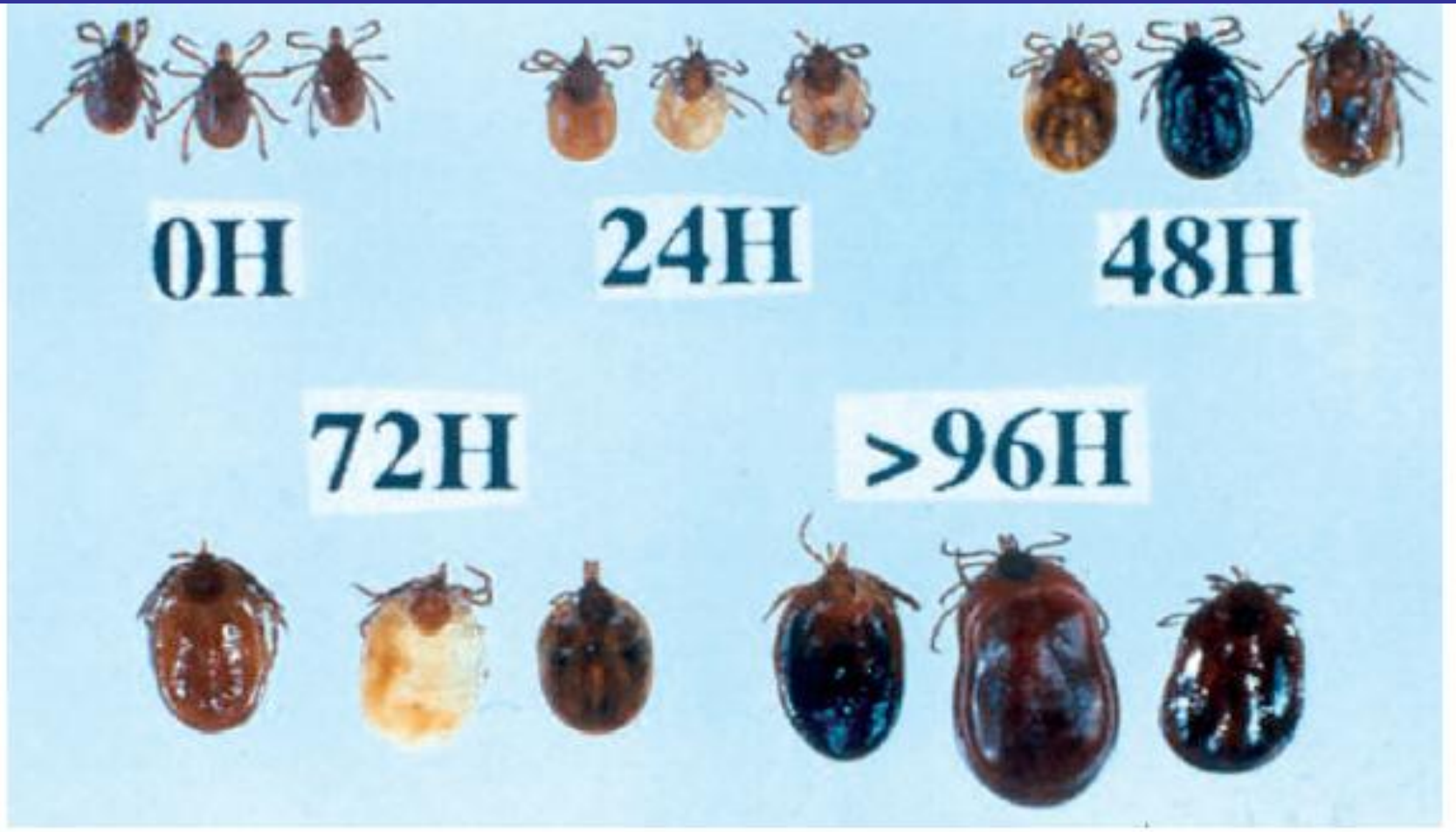
Larva


One Inch

**Smaller than an American dog/wood tick, adult female and nymph can transmit infection through a bite for a blood meal.**

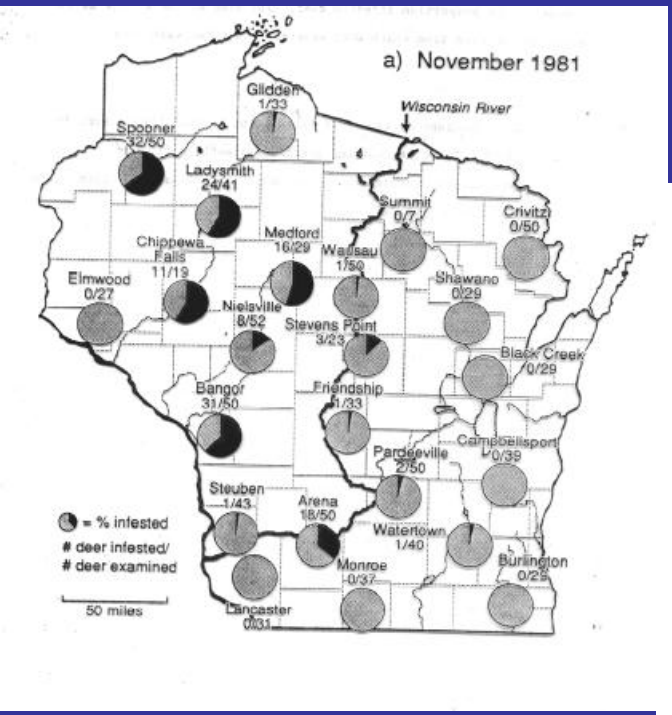
***Dermacentor variabilis*** **(American dog or wood tick).**

Stages of blood engorgement in female adult *Ixodes* ticks depicted by the durations of attachment (courtesy of the IDSA, Dr. Richard Falco-Fordham University).

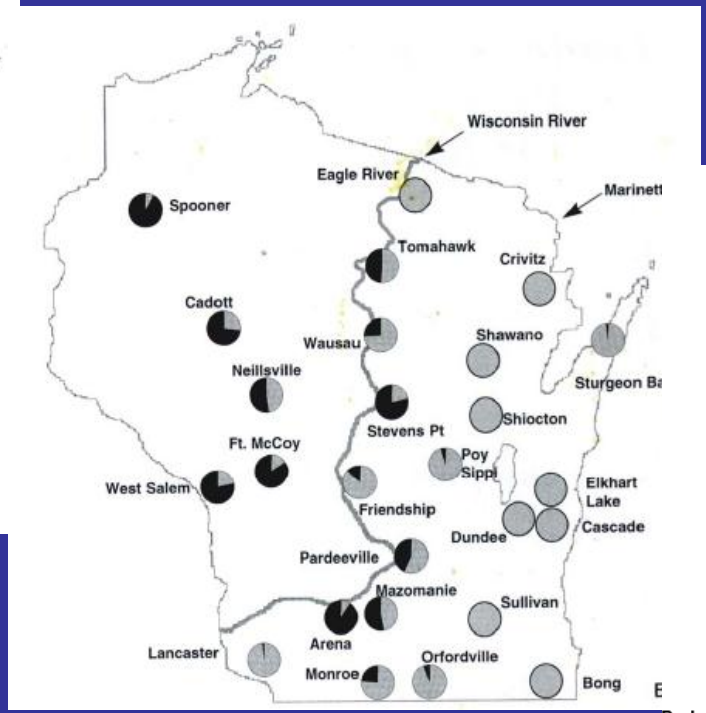


# UW-Madison, Department of Entomology - Tick Surveillance

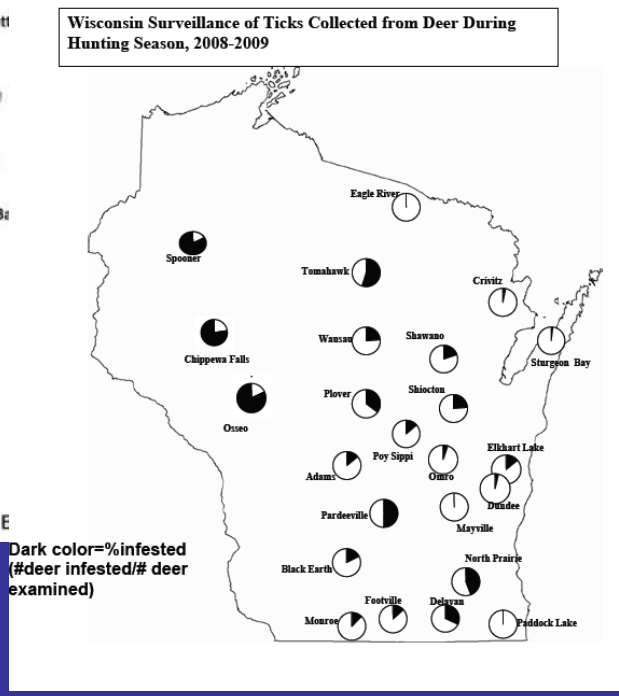
## 1981




## 1994




## 2008-2009




**Dark color of the pie = % deer infested with *Ixodes* ticks.**

# The Ticks Are Marching On…

Surveillance by the UW-Madison, Department of Entomology in 2010-2011

- *Ixodes* species ecology is established in urban parks in Madison (Arboretum, Sandburg, and Pheasant Branch Conservancy).
- Milwaukee County, Bayside Doctor's Park.
- Kettle Moraine in southern Waukesha County.
- Spring Green in Sauk County.
- Average state infectivity rate for *Borrelia* in nymphs is 22% (20-24%); other tickborne diseases infectivity rate are unknown.

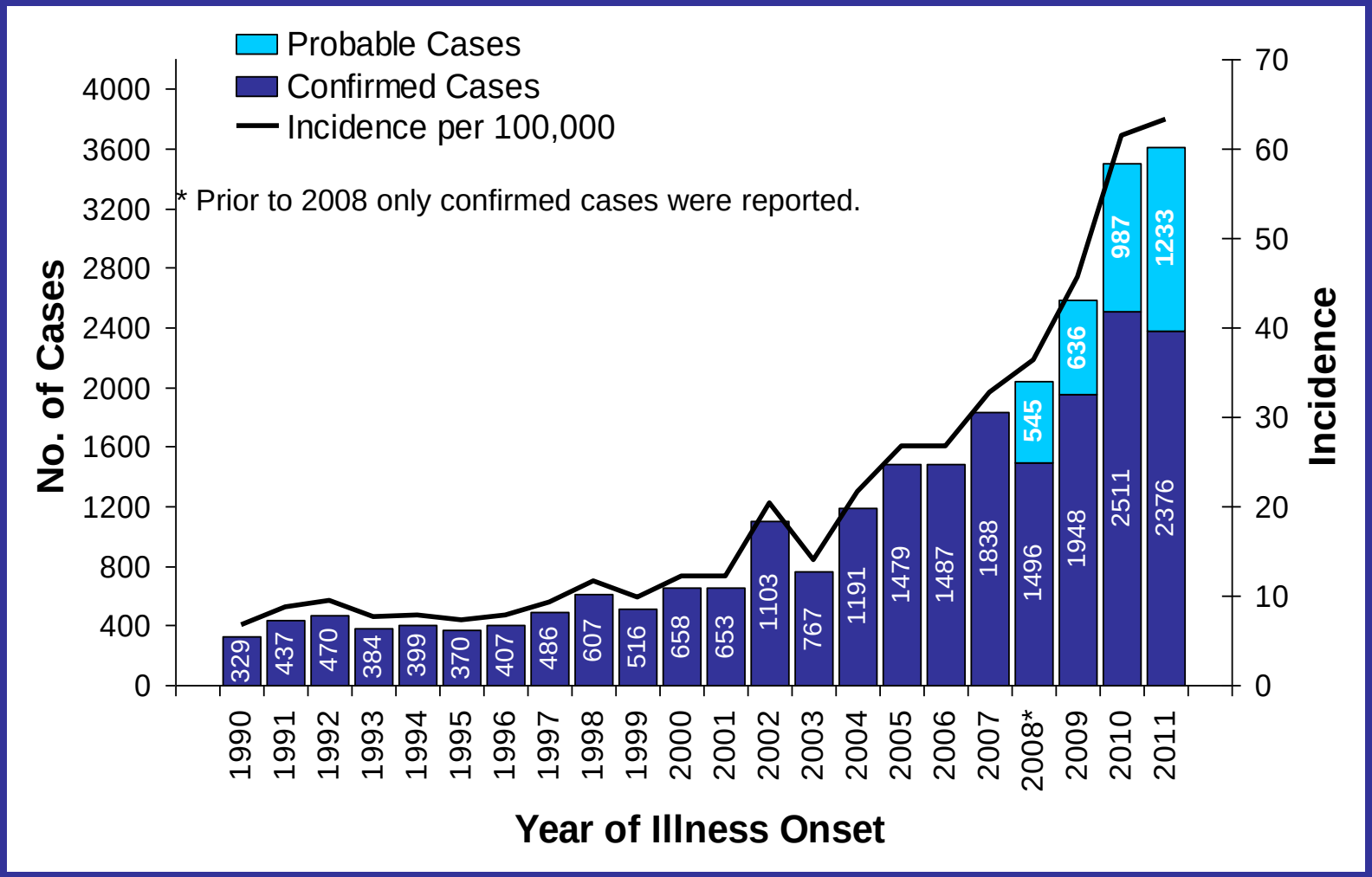
# Surveillance in WI, 2002-2011

| Tickborne Infections | Total Cases (%) 2011** n = 4,103 | 2002-2010 n = 16,996 |
|---|---|---|
| • Powassan | 4 (0.09) | 7 (0.04) |
| • Lyme disease | 3,313 (81) | 14,876 (86) |
| • Anaplasmosis/Ehrlichiosis | 697 (17) | 1,968 (11) |
| • Babesiosis | 79 (1.9) | 125 (0.7) |
| • Spotted Fever Rickettsiosis (SPF)* | 10 (0.24) | 20 (0.1) |

* Travel related infections.
**2011 numbers included confirmed and probable cases.

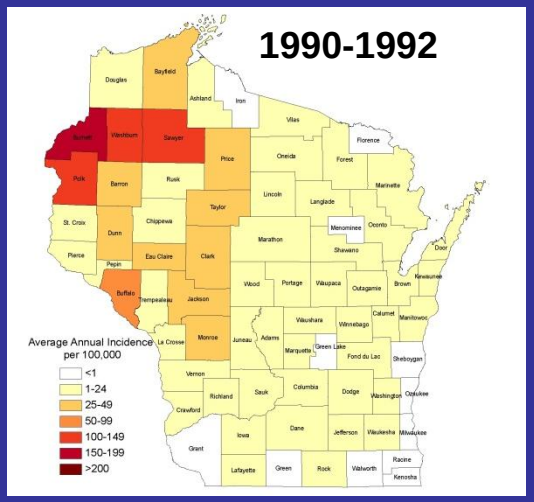
# Reported Lyme Disease, WI, 1990-2011

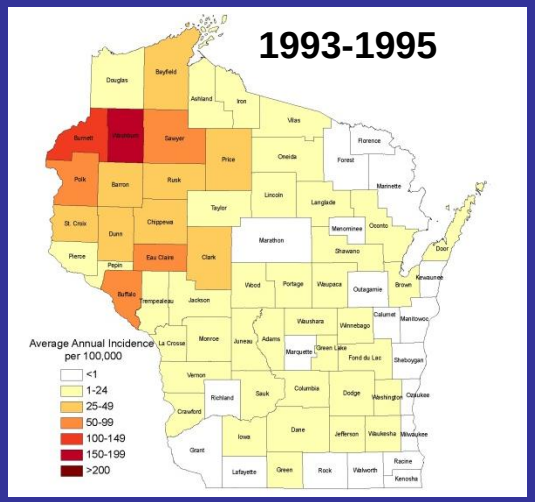
*(n=25,313)*

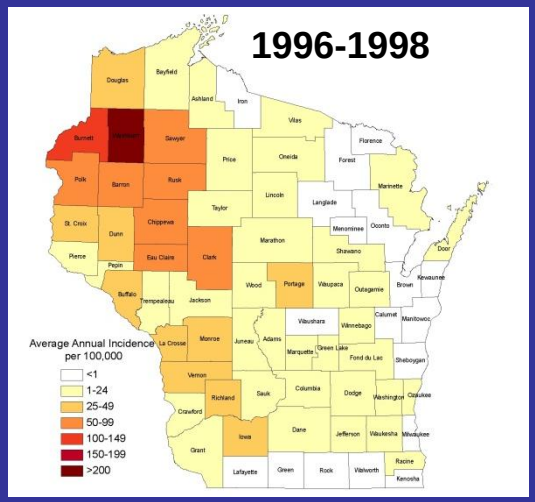


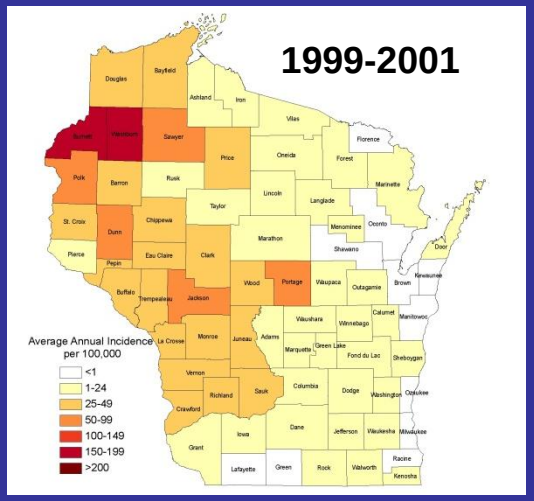

* Previous to 2008 only confirmed cases were reported. Beginning 2008, the total number of cases includes confirmed and probable cases.

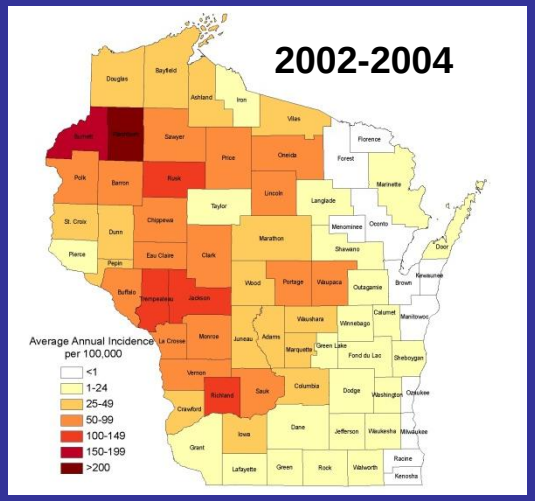
# Lyme Disease Average Annual Incidence Wisconsin, 1990-2007, by County of Residence

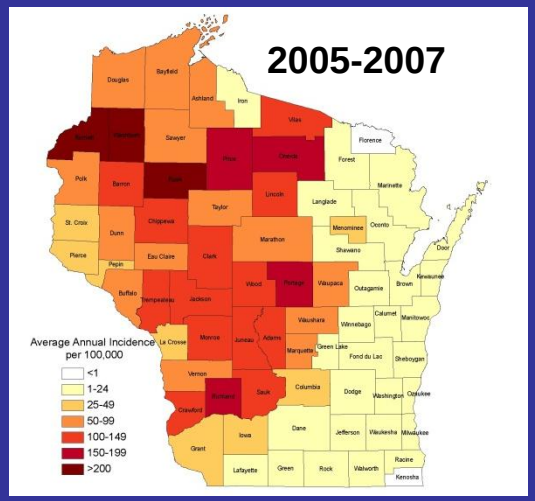


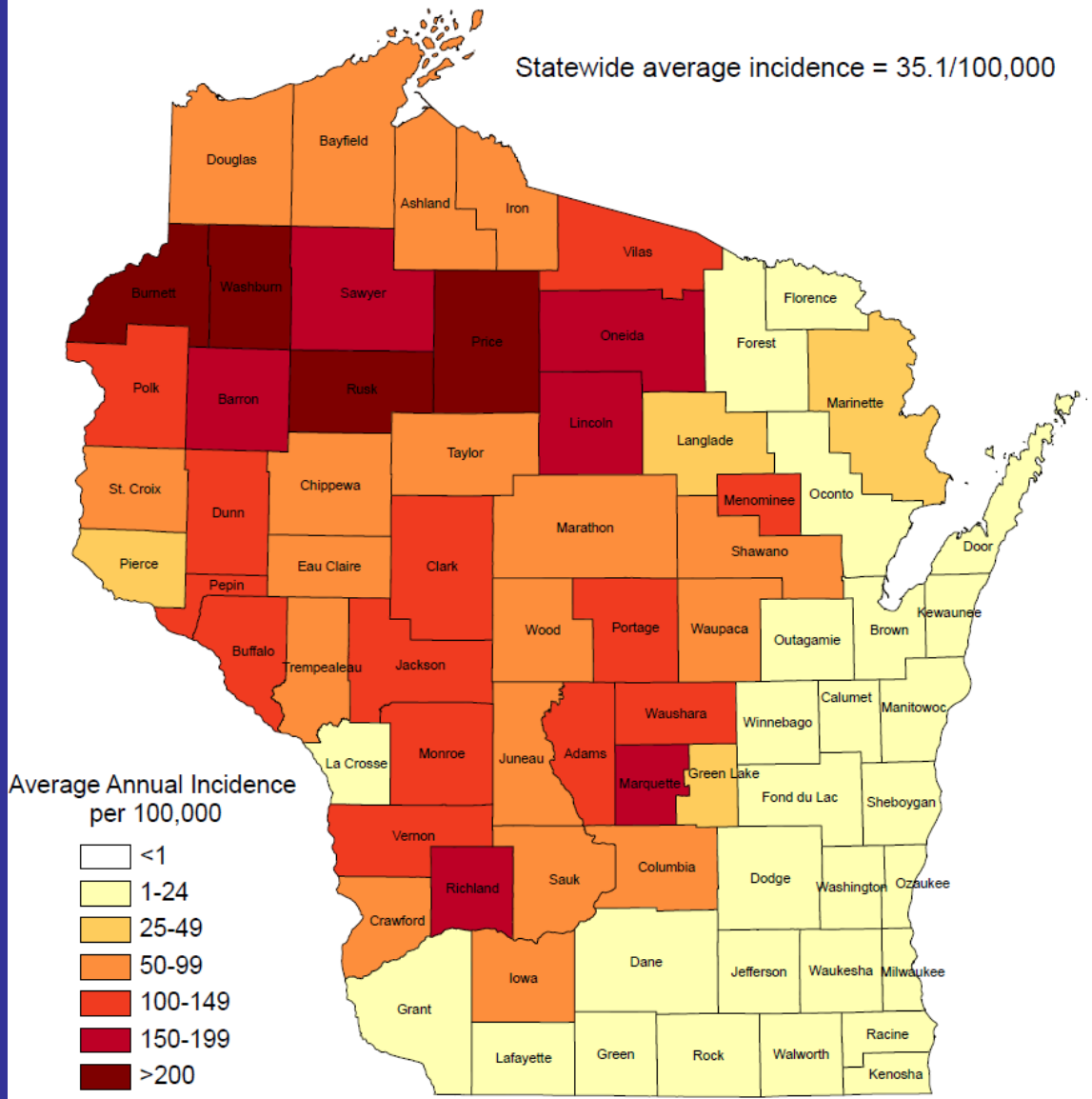



# Lyme Disease Average Annual Incidence
# Wisconsin, 2008-2010




This map is based on the county of residence of confirmed cases.
Some infections may have been acquired during travel to other areas.

# Lyme Disease

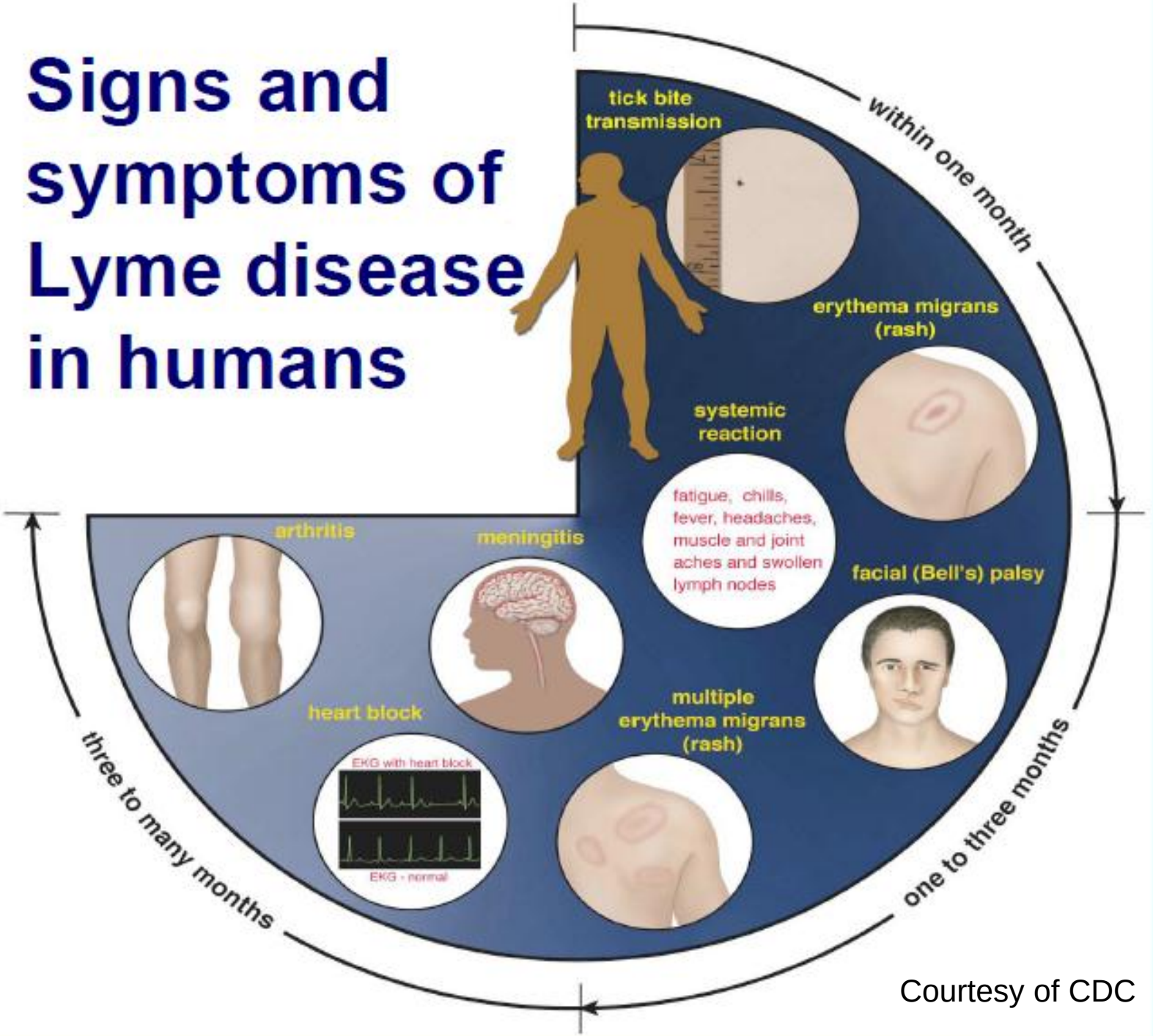
- Typical symptoms include…
  - Fever
  - Headache
  - Fatigue
  - Characteristic skin rash, erythema migrans, seen in approximately 80% of cases
- If left untreated, infection can spread to joints, the heart, and the nervous system

CDC

# Early Localized Stage - Erythema Migrans (EM)

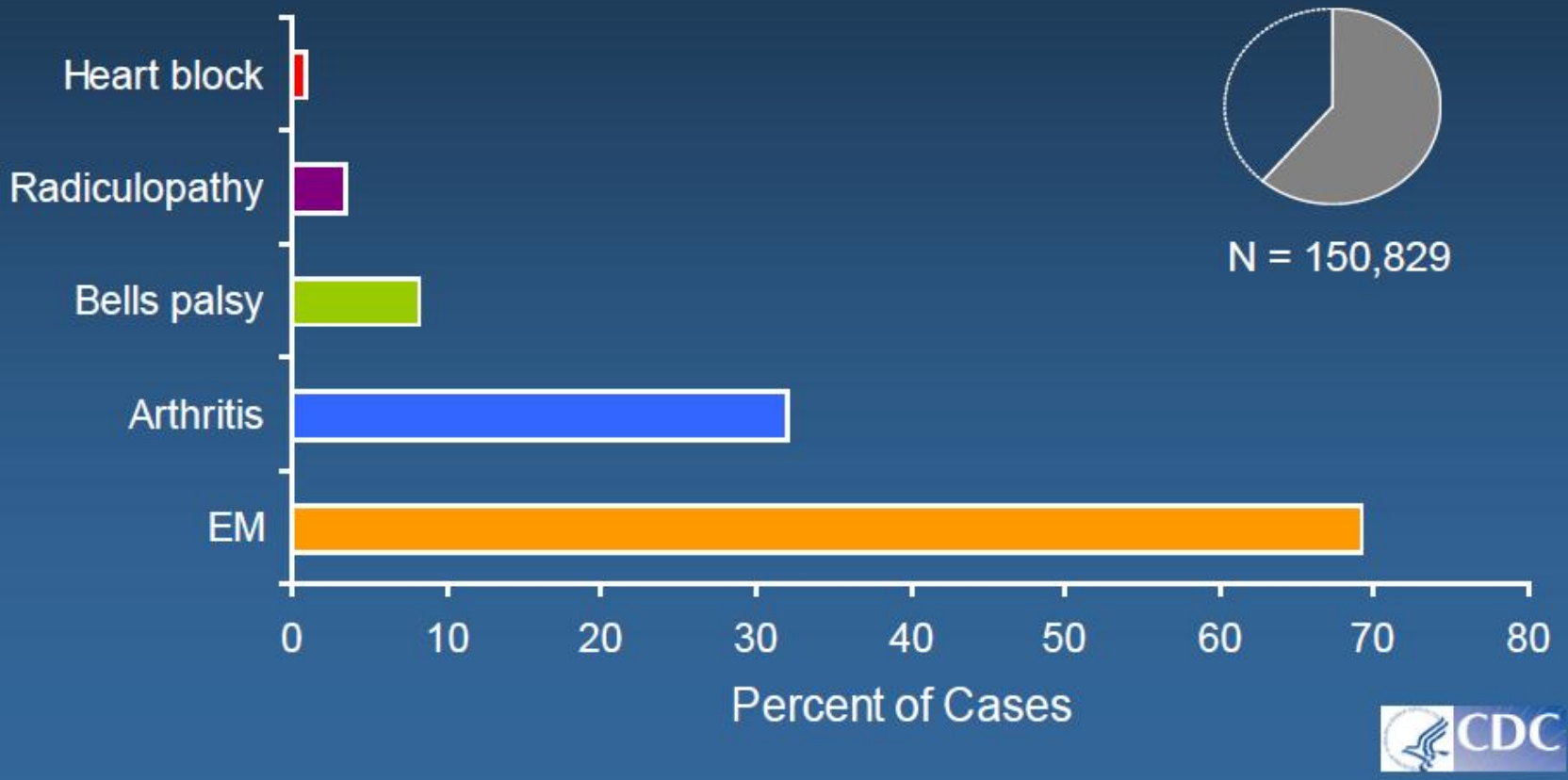
- Ticks must be attached for at least 24 to 48 hours to transmit *Borrelia* bacteria.
- The EM rash expands in size over time whereas an allergic reaction stays the same size.
- Illness including EM rash can occur within 30 days of tick bite (70% people).
- Since Lyme disease is endemic in WI, EM rash (>/=5cm) is considered as a confirmed case with or without lab testing and should be reported to health departments.

# Signs and symptoms of Lyme disease in humans



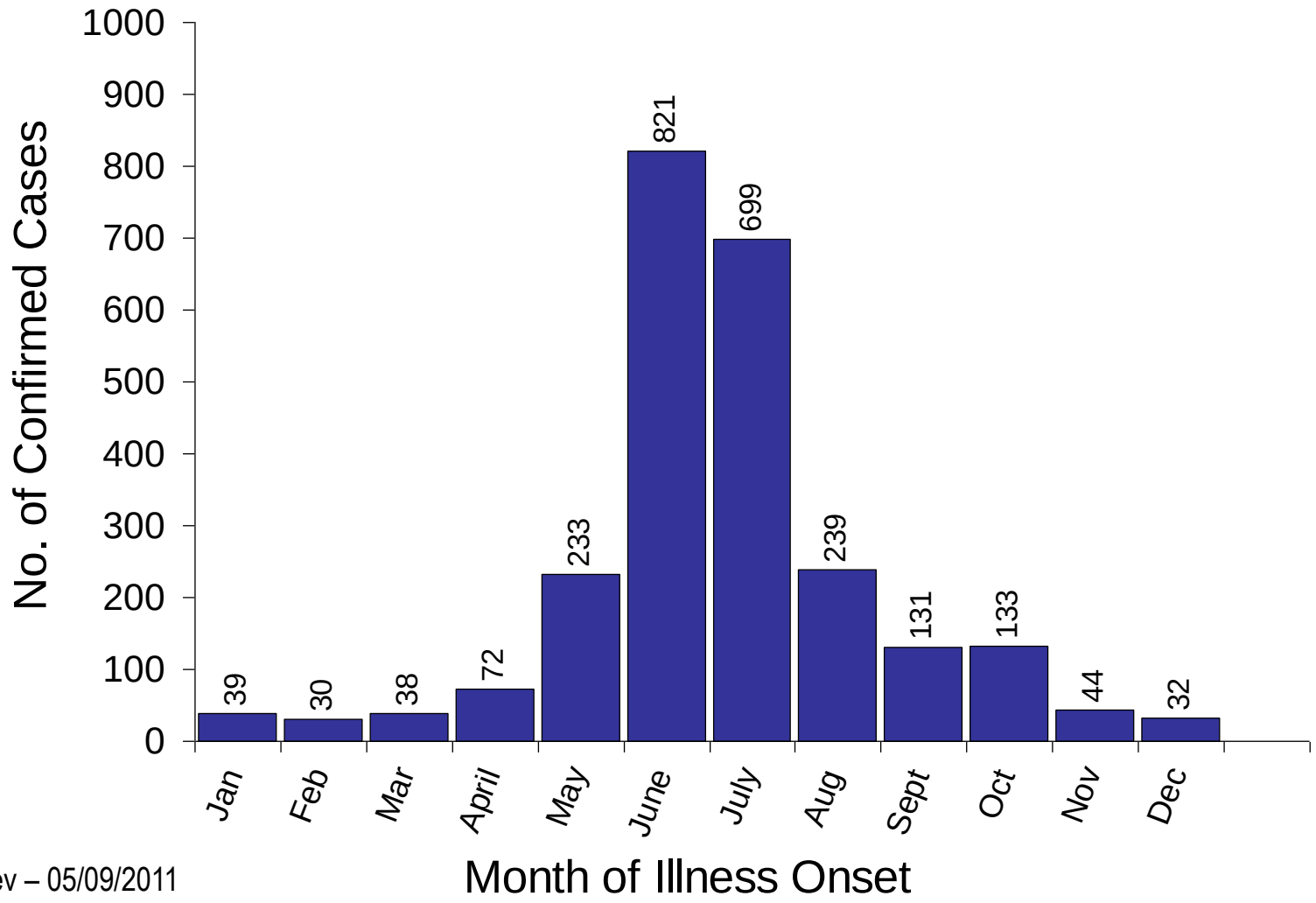

Courtesy of CDC

# Clinical features of Lyme disease cases reported to CDC, United States, 1992-2006



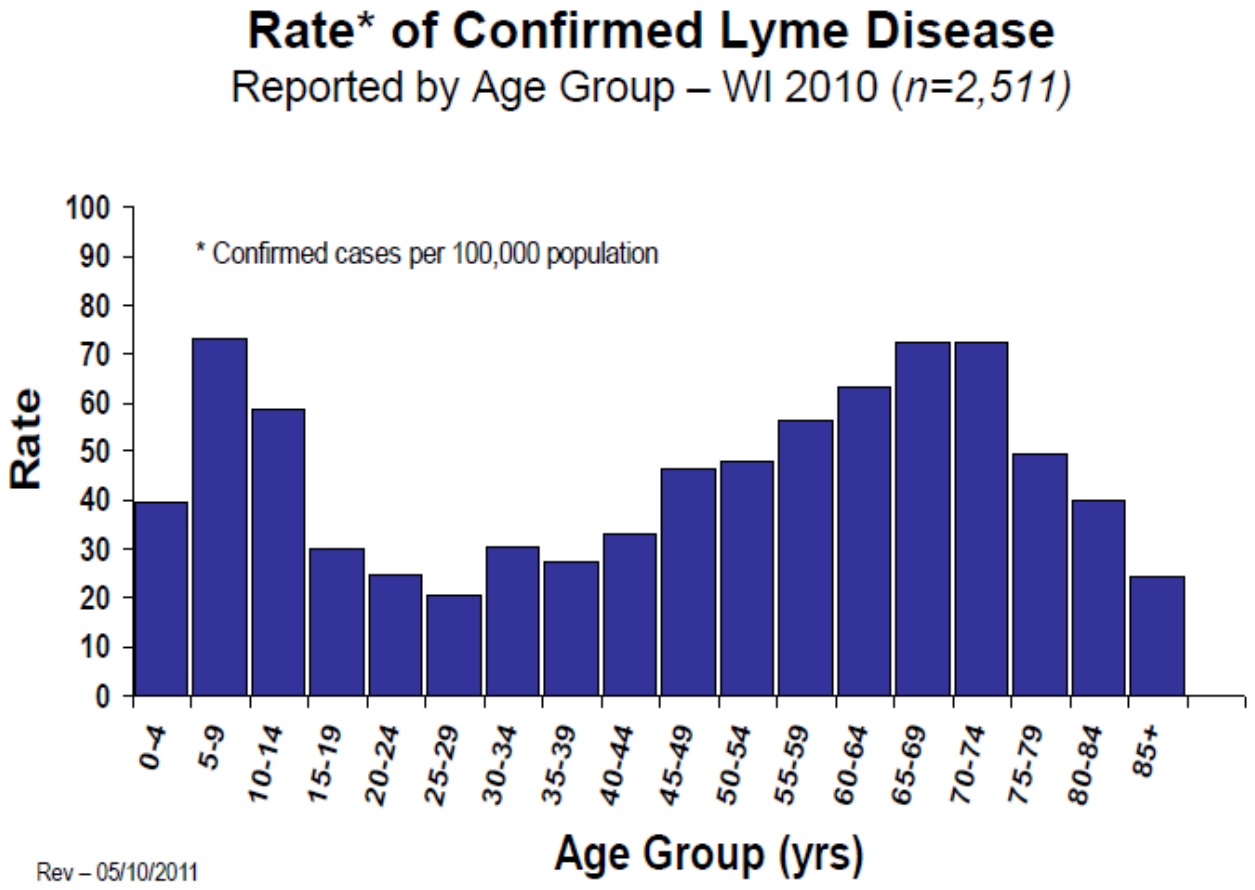
# Confirmed Lyme Disease Cases

Reported by Month – WI 2010 *(n=2,511)*




Rev – 05/09/2011

# Confirmed Lyme Disease by Age Group, WI, 2010



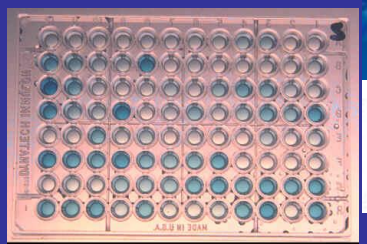

# Lyme Disease- Testing Methods

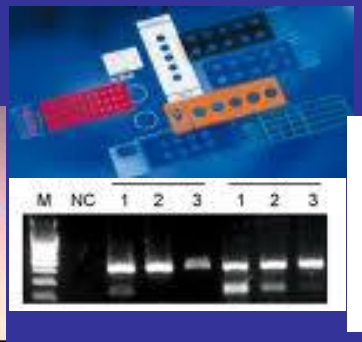
**Most common serologic assays to detect antibodies include:**

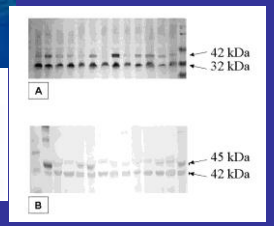
- Enzyme immunoassay (EIA) tests.
- Immunofluorescent assays (IFA).
- Western Blot test for IgM and IgG antibodies to *B. burgdorferri.*

Other less common tests:

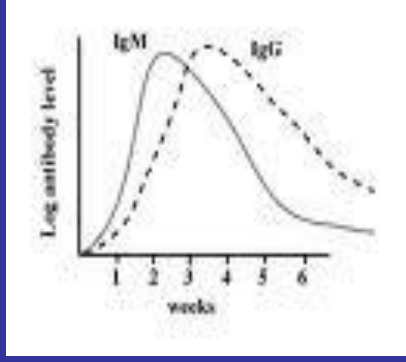
- Culture - detects growth of organism to confirm active infection.
- PCR - molecular method of detecting DNA of organism (synovial fluid).





# Lyme Disease- Antibody Response




**Both IgM and IgG can persist for years (10-20yrs).**

- Specific IgM response
  - Produce earlier than IgG.
  - Peaks within the first several weeks.
  - IgM is less specific than IgG.
  - Because testing for IgM can have false positive results and false negative results, it is less reliable as a marker for Lyme disease.
  - Generally highest among patients with early infection.

# Lyme Disease - Antibody IgG Response

- IgG antibody response is much more specific than IgM and it is the more reliable marker for Lyme disease.
  - IgG is produced a few weeks after IgM.
  - Peaks months to years.
  - Generally highest in later stages of infection.
  - Most active infections should have a positive IgG test result in one month.

# Lyme Disease - Treatment

- CDC uses the guidelines by the Infectious Diseases Society of America (IDSA).

- Antibiotics are very effective if treated early.
  - Children >/= 8 yrs and adult = doxycycline100mg 2x/day for 14 days.
  - Children < 8yrs = amoxicillin 50mg/kg/day in 3 divided doses

- Usually given orally but may be given intravenously in more severe cases.

- Recurrent symptoms may require a second course of antibiotic.

- Long-term intravenous courses (months to years) have not been shown to be beneficial but may cause more complications (gallstones, catheter-associated bloodstream infections).

# Prevention

- Prophylaxis (follow the IDSA guidelines).
  - 1 single dose of doxycycline (200mg) for adults and children >/= 8yrs, if it is given within 72 hrs after tick removal, tick has to be attached for at least 36hrs, and should only be used in area with at least 20% tick infectivity.
  - WI meets criteria because average nymphal tick infectivity rate is about 22% (range from 20-24%) statewide.
- No lasting immunity, can get infected more than once.
- No current available vaccine for humans since 2002, on-going research.

# Review of the Changes in Lyme Disease Reporting Requirement, June 2012.

# Why Are Tickborne Infections Reportable?

- Define demographic, geographic, and seasonal distribution.
- Monitor disease trends in a more consistent and unified manner with the same case definition for reporting.
- Identify areas where tickborne diseases may be emerging and risk exposures to WI residents.
- Evaluate where to target education, prevention, and control measures.
- Define disease characteristics and sequelae.
- Determine if the current diagnosis and treatment process is effective.
- Data available for future funding and research.

# Reasons for Changes in Reporting Requirements in 2012

Increased burden of Lyme disease reporting due to:

- Implementing the 2007 surveillance case definition that included investigating all reported positive laboratory results to classify cases according to the confirmed and probable criteria.

- Electronic reporting of laboratory results in the Wisconsin Electronic Diseases Surveillance System (WEDSS) has increased the workload (2-3 times prior to WEDSS) for state, local health departments (LHDs), and providers.

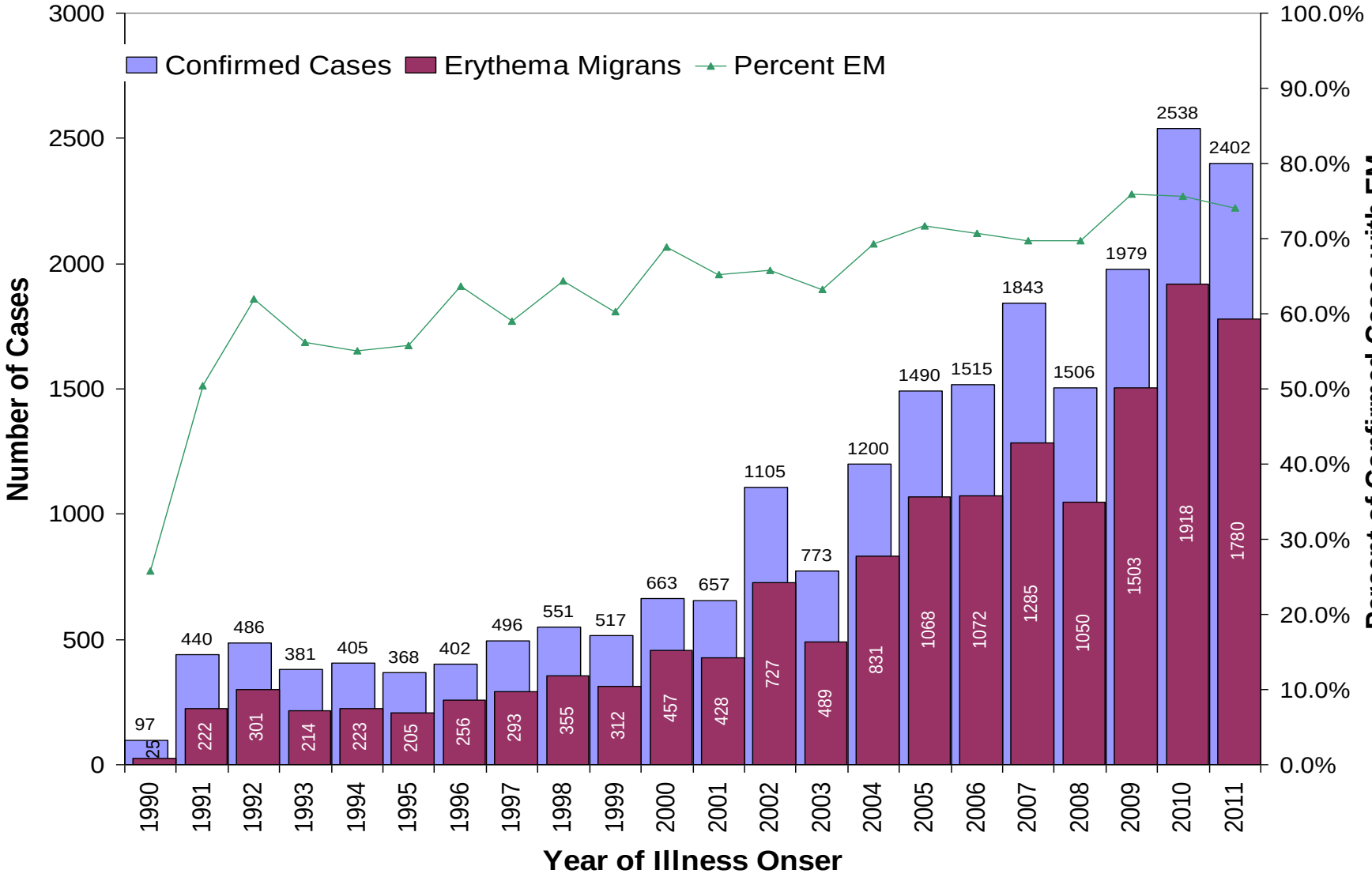
Some of the challenges identified by LHDs:

- Currently not sustainable long term, not a good use of reduced and limited resources and personnel, no funding for Lyme disease surveillance.

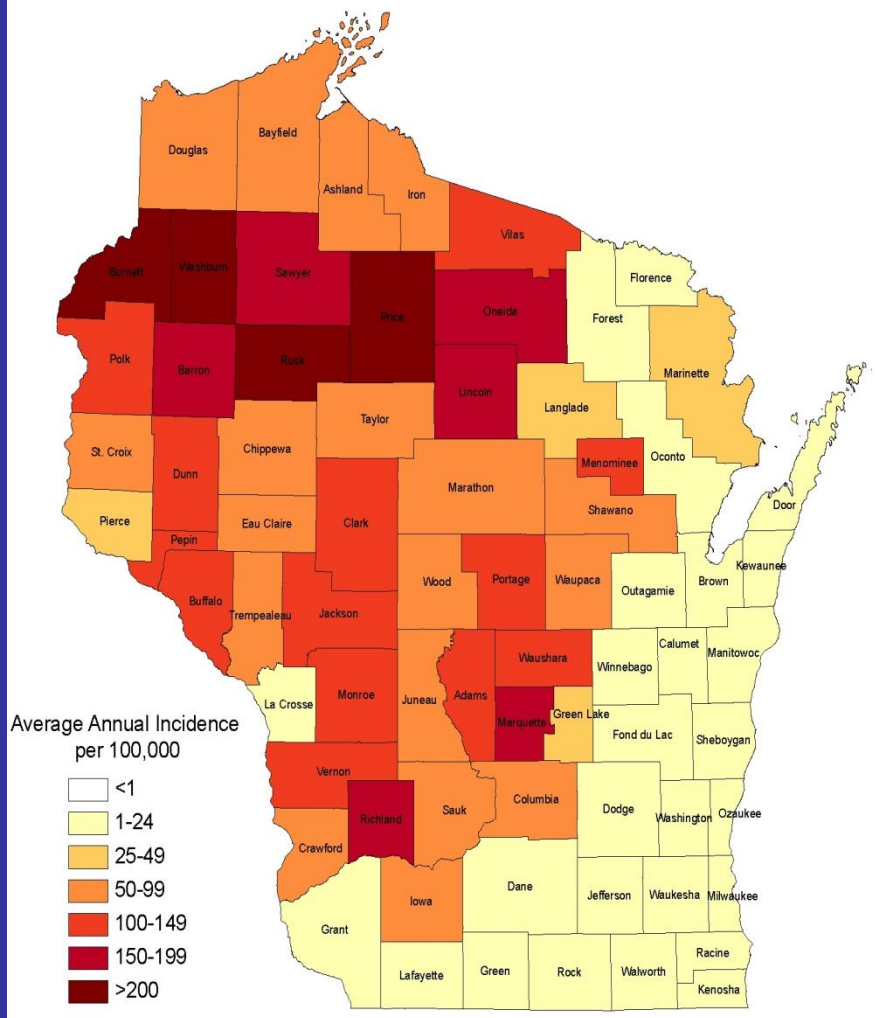
- Low priority on the LHDs list of communicable diseases.

- Negatively impacts investigation of other diseases at the LHD and provider level.

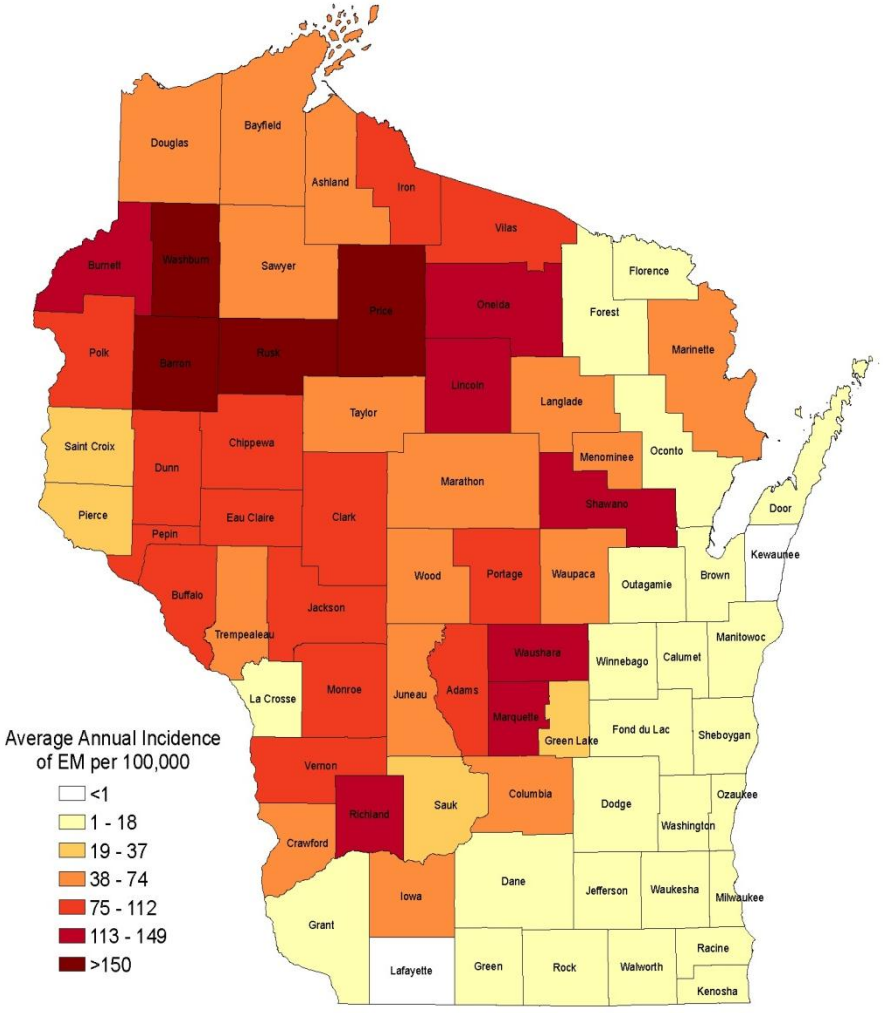
# Reported Confirmed and EM cases in WI, 1990-2011



## Lyme Disease Average Annual Incidence Wisconsin, 2008-2010




## Lyme Disease Erythema Migrans Average Annual Incidence Wisconsin, 2008-2010



# Reporting Requirements as of June 2012

**Required reporting:**

- Laboratories continue to report all Lyme positive results.
- Health care providers continue to report all cases of erythema migrans (EM ≥5cm and diagnosed by a physician or medical personnel).
- Continue to report date of illness onset and patient demographic information (address, birthdate, gender, race, and ethnicity).
- Reporting can be by electronic via WEDSS or hard copy.

**Optional reporting:**

- Reporting of Lyme disease cases without EM rash is now optional, unless requested by the LHDs (these include non-EM confirmed and probable cases).
- Reporting of signs and symptoms other than EM rash, exposure, and treatment information is now optional, unless requested by the LHDs.

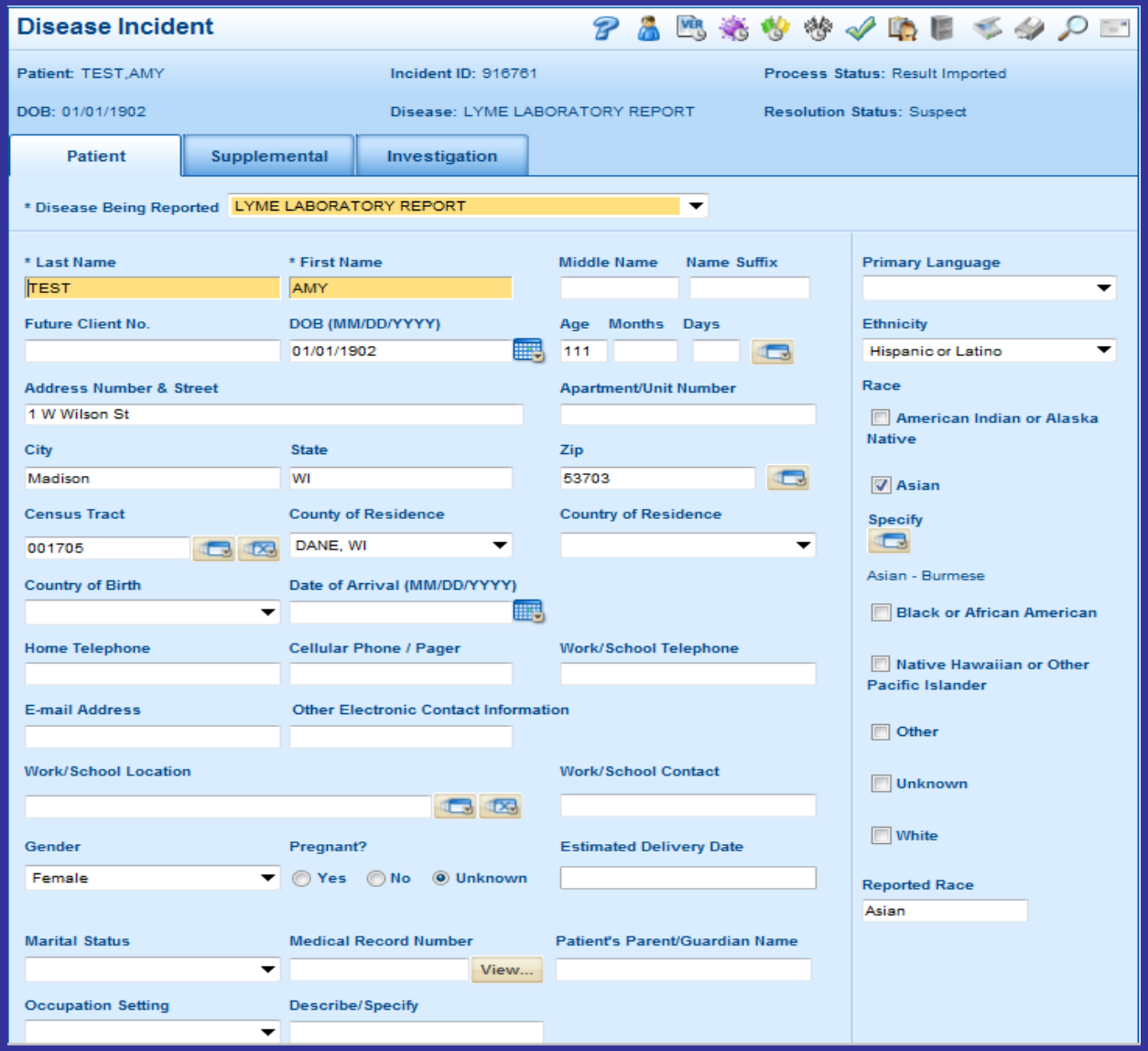
**Note:** It is the responsibility of each LHD to educate their providers on the changes in requirements and the specific needs within their jurisdiction.

# How are Lyme Disease reports being reported electronically?

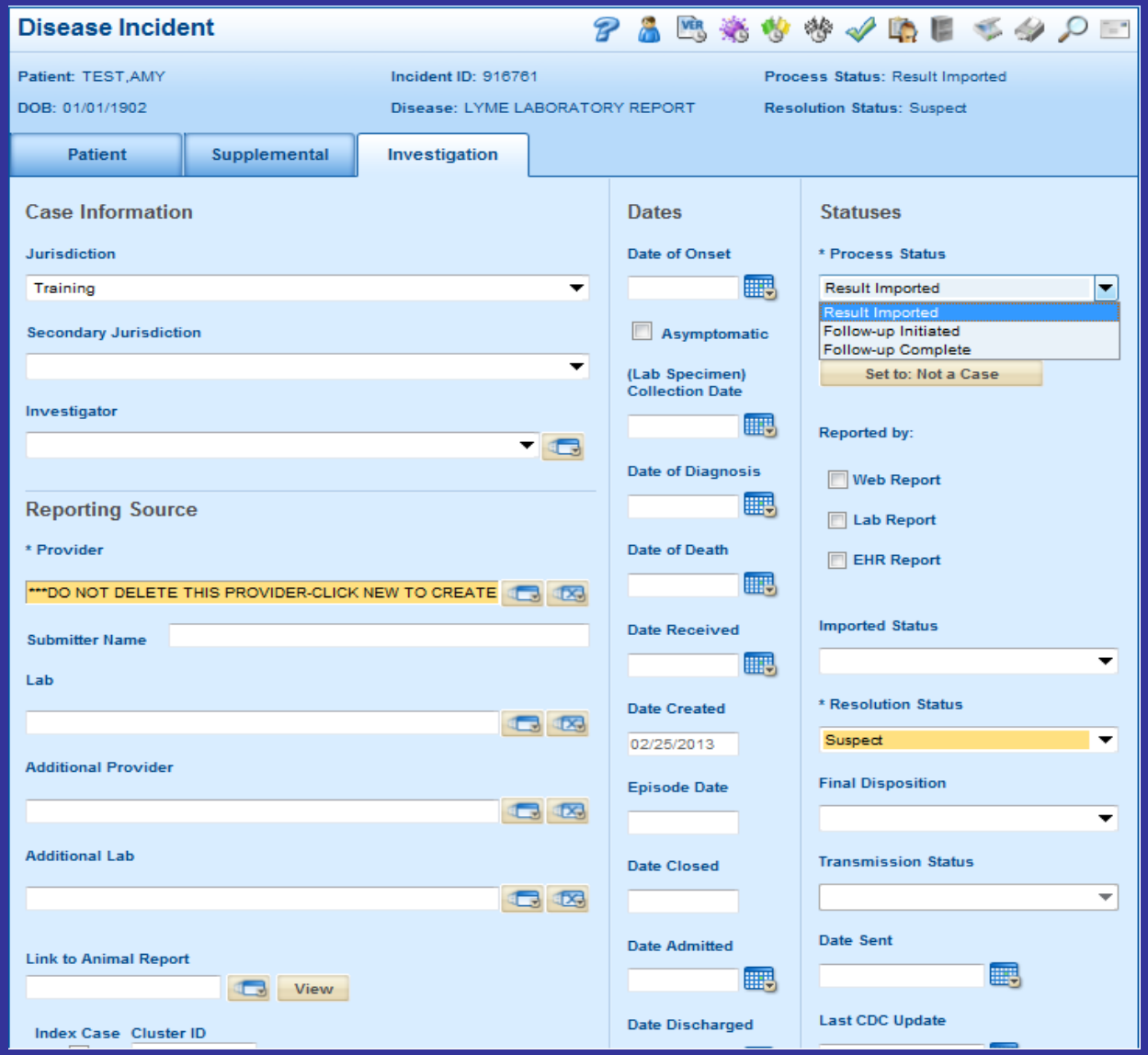
- Lyme Disease Incidence:
  - Web reports in staging area from medical providers using electronic reporting into WEDSS.
    - Imported by LHD into WEDSS for reports within their jurisdiction.
- Lyme Laboratory Reports:
  - Automated import of reports directly into WEDSS, bypassing staging area.
  - Some reports may be misclassified as “Unknown Disease” by laboratories during data entry into the staging area.
    - These reports will be imported into WEDSS by DHS staff.

# What to do with all the positive laboratory reports?

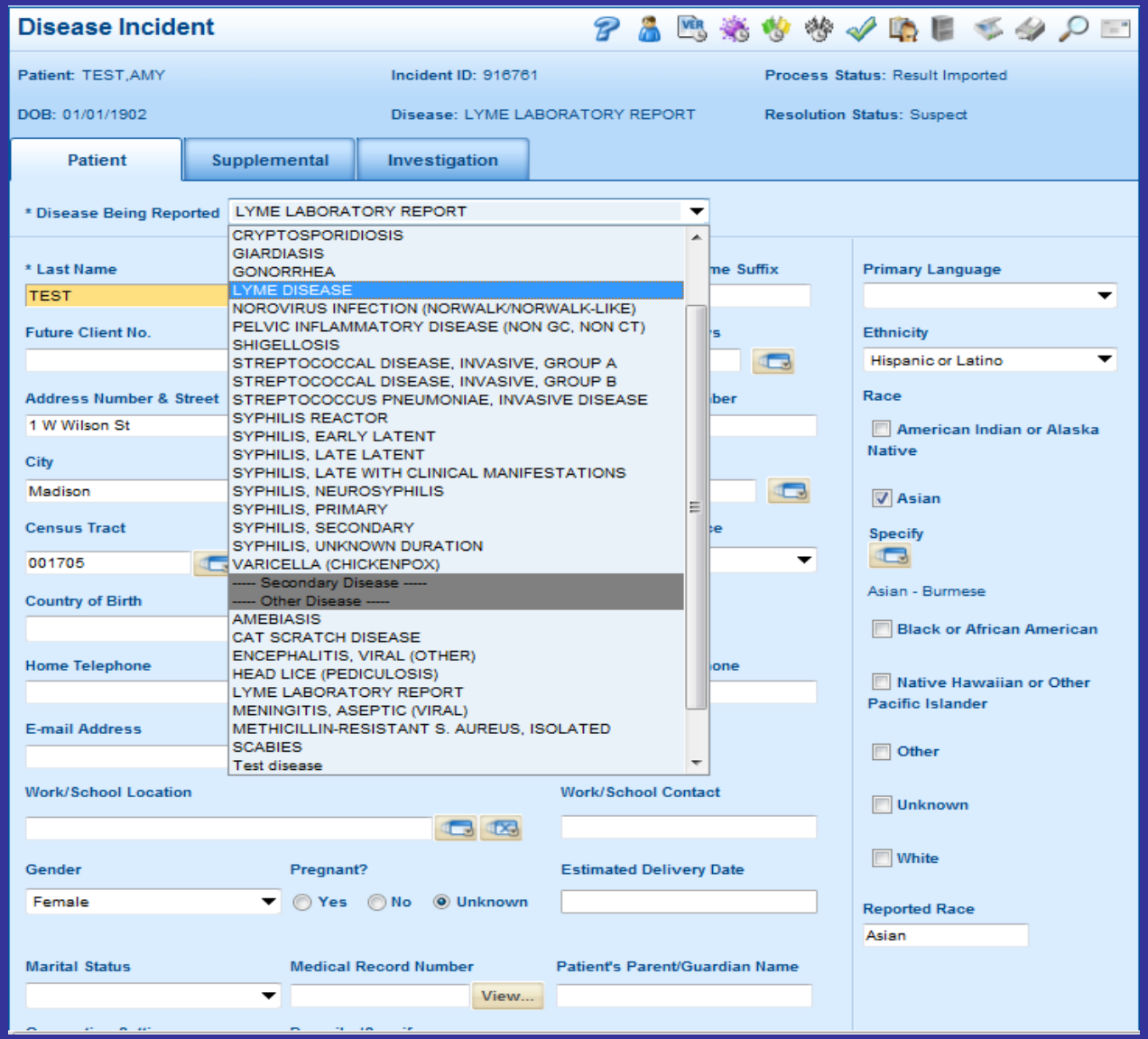
# Lyme Laboratory Report Form in WEDSS



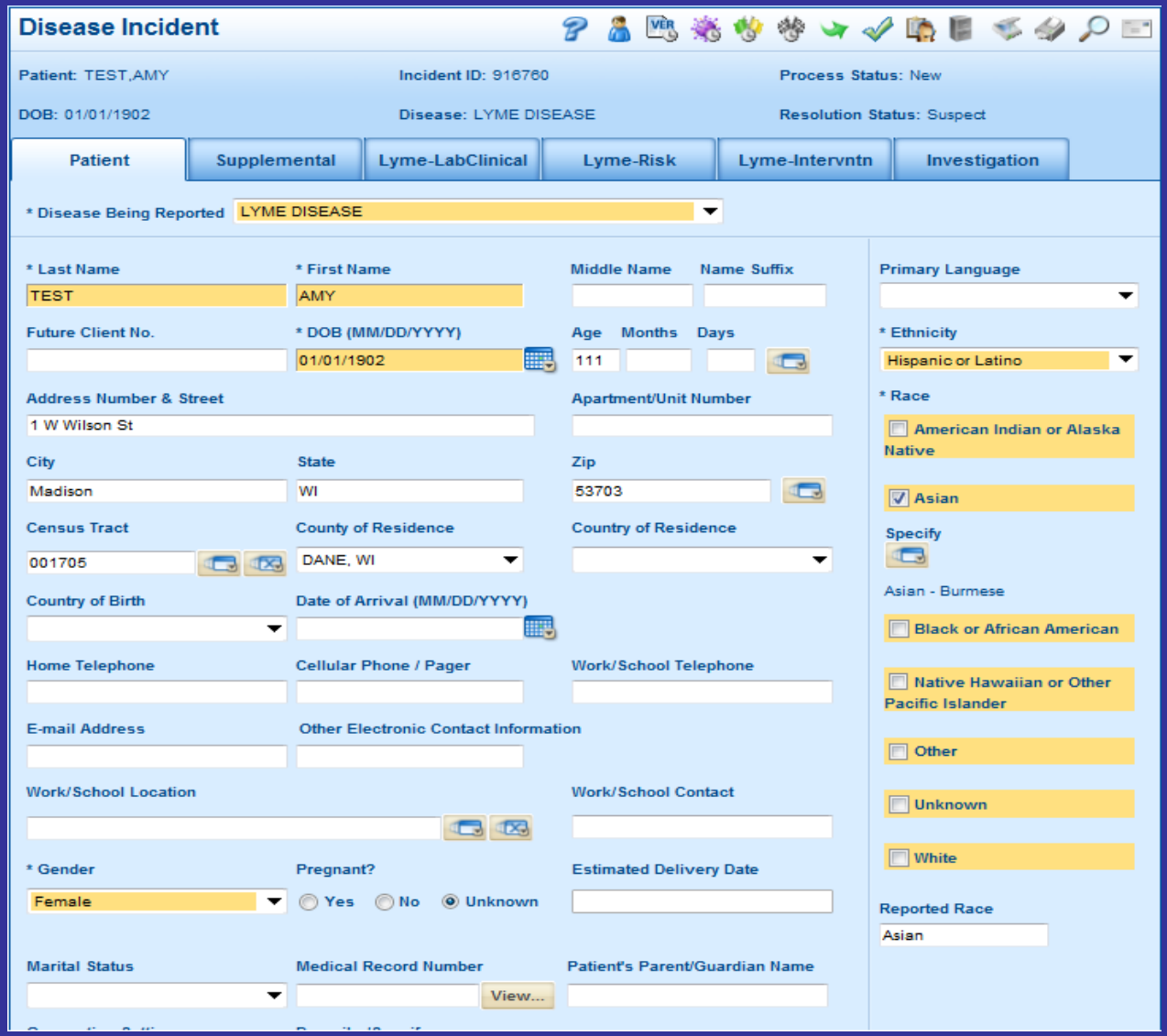
# Lyme Laboratory Report Form in WEDSS



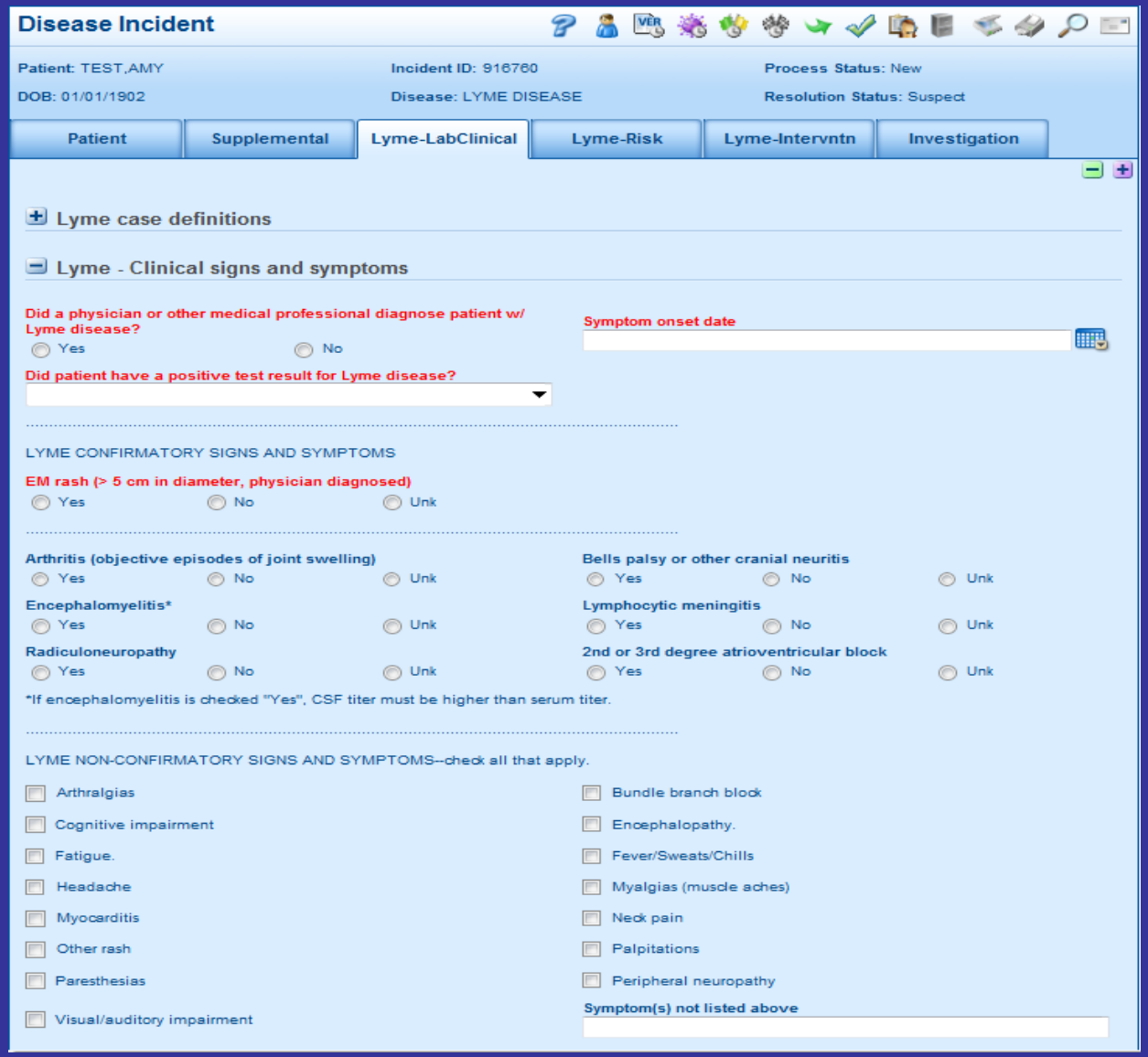
# Changing Lyme Laboratory Report Form to a Lyme Disease Incidence in WEDSS



# Lyme Disease Incidence Form in WEDSS



# Lyme Disease Incidence Form in WEDSS



# WEDSS Data Request

- If your LHD would like to access the Lyme Laboratory Report information in a different format, please contact: DHSWEDSS@dhs.wisconsin.gov.

- WEDSS Manager: Amy Bittrich.
  - Phone: (608) 261-6857.

# Additional Questions

**For all vectorborne questions:**

Diep (Zip) Hoang Johnson, Epidemiologist
Phone: (608) 267-0249
E-mail: diep.hoangjohnson@wisconsin.gov

**For Lyme disease and electronic reporting questions relating to Lyme disease:**

Chris Steward, Research Analyst
Phone: (608) 261-8354
Email: christopher.steward@wisconsin.gov